REMARKS

Summary of Amendments to the Claims

1. Claim 1 has been amended to delete $CH_2=C(CH_2OH)CO_2R'''$ from the list of acrylates. A typographical error in the first line of the claim has also been corrected.
2. Claim 2 has been canceled.
3. The second "claim 16" has been re-numbered as claim 17.
4. Claims 19 and 22 have been amended to delete $CH_2=C(CH_2OH)CO_2R'''$ from the list of acrylates.

Response to Items in "Detailed Action"

The following comments are submitted in response to the items set forth in the "Detailed Action."

Claim Objections

The second "claim 16" has been re-numbered as claim 17. Applicants thank the Examiner for pointing out this error.

Claim Rejections

1. Claims 1-2, 4-8, 10-14 and 18-28 are rejected under U.S.C. 103(a) as being unpatentable over Feiring et al (WO00/67072) in view of Malik et al (US20030022097A1).

2. The Examiner correctly points out that Feiring et al disclose fluorinated polymers and photoresists that involve a fluoroalcohol functional group with structure $-XCH_2C(R_f)(R_f')$-OH, and that Feiring et al do not teach the 2nd repeat unit.

Malik et al teach a photoresist composition comprising a polymer of acrylates such as t-butyl acrylate or t-butyl hydroxymethyl acrylate, a photoacid generator, a solvent and optionally a basic compound.

Claim 1 has been amended to delete $CH_2=C(CH_2OH)CO_2R'''$ from the list of acrylates from which the second repeat unit is derived. Claim 2 has been canceled.

Since Malik et al do not teach the use of an acrylate, $CH_2=CRCO_2R''$, in which R is H, F or a C_1-C_5 alkyl or fluoroalkyl group and R" is a polycyclic C_5-C_{50} alkyl group

containing at least one hydroxyl group, the combination of these references fails to teach or suggest Applicants' invention.

Applicants assert that claim 1 is now in condition for allowance, and that all remaining related dependent claims, claims 3-18, are also in condition for allowance.

3. The Examiner has also based rejection of independent claim 19, and related dependent claims 20 and 21, on a combination of the previously cited disclosures by Feiring et al and Malik et al.

Claim 19 has also been amended to delete $CH_2=C(CH_2OH)CO_2R'''$ from the list of acrylates from which the second repeat unit is derived.

For the reasons stated above, Applicants believe that claim 19, and dependent claims 20-21, are now in condition for allowance.

4. The Examiner has also based rejection of independent claim 22, and related dependent claims 23-28, on a combination of the previously cited disclosures by Feiring et al and Malik et al.

Claim 22 has also been amended to delete $CH_2=C(CH_2OH)CO_2R'''$ from the list of acrylates from which the second repeat unit is derived.

For the reasons stated above, Applicants believe that claim 22, and dependent claims 23-28, are now in condition for allowance.

5. Claims 15-17 have been rejected under U.S.C. 103(a) as being unpatentable over Feiring et al (WO00/67072) in view of Malik et al (US20030022097A1), and further in view of Feiring et al (WO00/17712).

Feiring et al (WO00/17712) does not teach or suggest the use of an acrylate, $CH_2=CRCO_2R''$, in which R is H, F or a C_1-C_5 alkyl or fluoroalkyl group and R" is a polycyclic C_5-C_{50} alkyl group containing at least one hydroxyl group. The other two references are similarly silent on this point. Therefore, the combination of these three references, pairwise or taken all together, fails to teach or suggest Applicants' invention as presented in claim 1.

Since Claims 15–17 are indirectly dependent on claim 1, Applicants assert that claim 1 as amended is now in condition for allowance and that dependent claims 15-17 are also in condition for allowance.

6. Claim 3 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Feiring et al (WO 00/67072) in view of Malik et al (US20030022097A), and further in view of Nishimura et al (US006838225B2).

The Examiner has correctly noted that both Feiring et al and Malik et al do not teach hydroxyadamantyl acrylate in the photoresist composition. The Examiner has also correctly noted that Nishimura et al teach a radiation-sensitive resin composition comprising one or more recurring units from mono-functional monomers which include 3-hydroxyadamantyl acrylate.

However, Applicants respectfully disagree that it would have been obvious at the time the invention was made to include the monomers of hydroxyadamantyl acrylate taught by Nishimura et al in the photoresist compositions of Feiring et al in order to obtain the advantages of high transmittance of radiation, high sensitivity, resolution, dry etching tolerance, and pattern shape.

To begin with, one must consider the polymer of the photoresist composition as a whole, not just as a collection of discrete, interchangeable and independent monomer units. The performance and properties of a photoresist polymer are determined by a myriad of factors, including but not limited to the identity of the monomer subunits. If one could predict the properties of a polymer simply by knowing which monomers were used in its preparation, the design of photoresist polymers would be quite straightforward. But such is not the case.

Even for very closely related polymers, the performance characteristics may vary for unknown reasons. This is evident even in the data presented by Nishimura et al. Examples 1 and 6 contain exactly the same monomers in very similar ratios (a compound of formula (6) and 2-methyl-2-adamantyl methacrylate in 60:40 and 50:50 molar ratios), but the performance characteristics are measurably different in three categories (radiation transmittance, sensitivity and dry-etching resistance).

Similarly, Examples 3 and 7 of Nishimura et al contain exactly the same three monomers: a compound of formula (6), 2-methyl-2-adamantyl methacrylate, and 3-hydroxyadamantyl acrylate. The compositional differences for this terpolymer are even more modest than the differences between Examples 1 and 6 (30:40:30 vs 30:45:25), and yet the differences in performance between Example 3 and Example 7 are more pronounced, especially in terms of sensitivity.

Given the data in Table 3 or Nishimura et al, one would have very little motivation to incorporate 3-hydroxyadamantyl acrylate in a photoresist polymer of any kind. The data in Table 3 shows that the addition of this monomer has an unpredictable effect on radiation transmittance, and in some cases the resulting polymer transmits less light than one which does not contain that monomer. Similarly, the addition of this monomer has an unpredictable effect on sensitivity, and in some cases the resulting polymer is less sensitive than one which does not contain that monomer. "Resolution" and "pattern configuration" are listed as 0.15 micron and

"good" for all but one of the 12 examples, suggesting that these properties are not influenced by the presence or absence of 3-hydroxyadamantyl acrylate.

Given that there exists a significant degree of unpredictability of photoresist polymer properties even among very closely related polymers, it is likely to be even more difficult to predict the influence on performance properties a given monomer will have in a substantially different polymer. There is no reason to assume or expect that the incorporation of 3-hydroxyadamantyl acrylate in the photoresist compositions of Feiring et al would confer any particular advantage, especially since there is no teaching in Nishimura et al that this monomer confers any advantage to the radiation-sensitive resin compositions taught therein.

Applicants assert that claim 1 is not obvious in view of the cited references, and therefore request that allowance of this claim be granted.

7. Claim 9 has been rejected under 35 U.S.C. 103 (a) as being unpatentable over Feiring et al (WO 00/67072) in view of Malik et al (US20030022097A1), and further in view of Adelman (US 003444148).

The Examiner correctly points out that both Feiring et al and Malik et al do not teach the functional group $-(CH_2)C(R_f)(R_f')$-OH, and Adelman may teach solid film-forming copolymers of certain terminally unsaturated polyfluorinated alcohols, such as $CH_2=C(R)-CH_2-C(CF_2R^1)(CF_2R^2)$-OH.

However, neither Feiring et al, nor Malik et al, nor Adelman teach the second repeat unit derived from $CH_2=CRCO_2R''$ of the fluorine-containing copolymer in claim 1 as currently amended.

Therefore, this set of references – taken in any combination – fails to teach or even suggest the invention of claim 9.

Applicants assert that claim 9 is not obvious in view of the cited references, and therefore request that allowance of this claim be granted.

In view of the foregoing, allowance of the above-referenced application is respectfully requested.

Respectfully submitted,

Karin J. Karel

Karin J. Karel
PATENT AGENT FOR APPLICANTS
Registration No.: 33,918
Telephone: (302) 695-4641
Facsimile: (302) 695-2598

Dated: April 28, 2006